

Status of Rare and Endangered Birds in Captivity with a General Reference to Mammals

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Of the 340 bird forms reported by the IUCN as rare and endangered, 62 were reported in captivity from 1964 to 1970. Among the 62 captive forms, 30 bred once or more in captivity but only 24 bred with frequency. Significant captive breeding success occurred primarily in the Anseriformes, Galliformes, and Psittaciformes. Only nine forms appear secure with regard to captive numbers and reproductive rate.

INTRODUCTION

VIRTUALLY EVERY ZOO has repeatedly stated as a major objective the captive propagation of endangered species as a mechanism for saving such animals from extinction. This goal has served as a justification for the possession of endangered animals. The International Union for the Conservation of Nature and Natural Resources (IUCN) has endorsed this principle as one viable alternative to extinction. This paper represents an effort to evaluate the captive status of rare and endangered birds from 1964 through 1970 currently listed in the IUCN Red Data Book. A general analysis is given for mammals during the same period.

METHODS

Data for each form listed in the current bird and mammal Red Data Book lists were compiled from the International Zoo Yearbook's (IZY) lists of rare and endangered animals and animals bred in captivity, Volumes 5 through 11. Areas examined for each species were: 1) number of exhibiting zoos; 2) number of zoos reporting births or hatchings; 3) total species number; 4) total number captive born surviving; 5) number born for each year; and 6) number of zoos possessing a breeding potential. Although each year was analyzed, the tables of this paper were prepared using two-year intervals. Rather than indicate sex, a number representing reproduction potential is used. It is derived for each species by counting the number of zoos indicating the possession of both sexes and/or breeding success. When this number is compared to the number of births and number of young born, a statement of trend can be made. Birth data is

always given for the year preceding the year-book volume and has been adjusted accordingly.

It must be recognized that figures presented here are in many cases incomplete or inaccurate due to several reasons, including 1) irregular reporting by institutions; 2) taxonomic misidentification; 3) failure to provide numerical assessments for individual species; 4) failure of some countries to report; 5) lack of information from private breeders; 6) lack of information on ages of stock; and 7) lack of consistent survival criteria. Because of these factors, the data presented here are simply indicators of trends, but it is felt that they do reflect with some accuracy the captive status of rare and endangered birds and mammals in major zoo facilities from 1964 through 1970.

AVES

General Comments. For the 27 orders of birds, seven (Struthioniformes, Rheiformes, Casuariiformes, Apterygiformes, Gaviiformes, Coliiformes, and Trogoniformes) contain no forms considered rare and endangered for the purposes of this paper (Table 1). The remaining 20 orders contain 340 rare and endangered forms. Nine orders were represented in captivity by 62 forms (18.2 percent of all endangered forms). Six orders (Ciconiiformes, Anseriformes, Galliformes, Gruiformes, Psittaciformes, and Passeriformes) contain 30 breeding forms which is 48.9 percent of all forms exhibited, but only 8.8 percent of the total number of rare and endangered species. For the 30 breeding forms represented in captivity, only 24 have bred with any consistency and quantity. Rare and endangered forms were represented in captivity in three additional orders (Sphenisciformes, Fal-

coniformes, and Columbiformes) but no breeding was reported.

Those orders containing rare and endangered forms which have been reported in captivity during 1964 through 1970 are reviewed below.

Sphenisciformes. The Galapagos penguin is the single Red Book representative and was infrequently reported in captivity, only once with breeding potential.

Ciconiiformes. Five forms are rare and endangered (4 sp., 1 ssp.). The Japanese white stork data is incomplete, lacking in data from Chinese zoos. A captive breeding project in

Japan has so far not proven successful. The red-cheeked ibis or waldrapp (Table 2) is reproducing primarily from two large groups at Basle and Innsbruck.

Anseriformes. Thirteen forms (9 sp., 4 ssp.) are rare and endangered and nine were reported in captivity. Eight bred frequently, while the white-winged wood duck reported only at Slimbridge in 1964, 1969, and 1970, has been less than successful. Table 3 indicates status of the remaining eight forms. The Hawaiian goose is a classic captive-breeding success story (Fisher et al., 1969), with stock, breeding potentials,

TABLE 1. *ORDINAL SUMMARY OF CAPTIVE STATUS FOR RARE AND ENDANGERED BIRDS — 1964-1970

Order	IUCN Forms	Forms in Captivity	Rarely	Captive Breeding Frequent	Total
Sphenisciformes	1	1	0	0	0
Struthioniformes	0	0	0	0	0
Rheiformes	0	0	0	0	0
Casuariiformes	0	0	0	0	0
Apterygiformes	0	0	0	0	0
Tinamiformes	2	0	0	0	0
Gaviiformes	0	0	0	0	0
Podicipediformes	5	0	0	0	0
Procellariiformes	6	0	0	0	0
Pelecaniformes	2	0	0	0	0
Ciconiiformes	5	2	0	1	1
Anseriformes	13	9	1	8	9
Falconiformes	21	4	0	0	0
Galliformes	32	19	1	10	11
Gruiformes	21	9	2	1	3
Charadriiformes	11	0	0	0	0
Columbiformes	16	2	0	0	0
Psittaciformes	29	11	1	3	4
Cuculiformes	3	0	0	0	0
Strigiformes	9	0	0	0	0
Caprimulgiformes	2	0	0	0	0
Apodiformes	15	0	0	0	0
Coliiformes	0	0	0	0	0
Trogoniformes	0	0	0	0	0
Coraciiformes	2	0	0	0	0
Piciformes	9	0	0	0	0
Passeriformes	136	5	1	1	2
Total	340	62	6	24	30

* does not include the Arabian ostrich

TABLE 2. ANALYSIS OF RARE AND ENDANGERED CICONIIFORMES FREQUENTLY BREEDING IN CAPTIVITY

Species	Year	Number of Zoos			Population		Percent Captive Born
		Total	Poten. Breed.	Births	Total	Births	
<i>Geronticus eremita</i> (Red-cheeked ibis)	1964	*n.d.	n.d.	3	n.d.	11+	n.d.
	1966	10	4+	3	50(28)	?	56
	1968	n.d.	n.d.	5	n.d.	10+	n.d.
	1970	14	7+		77(58)+		75

* n.d. = no data

and numbers of exhibiting institutions increasing, and the native habitat restocked. Encouraging success is also true for the cereopsis, Cuban tree duck, Laysan duck, and koloa. However, in all cases small numbers of wild-caught birds continue to be taken. Data is too limited for judgment on the Mexican duck and Aleutian Canada goose. The New Zealand brown teal, although breeding at Slimbridge and Peakirk, is not increasing. It is felt that the bulk of captive waterfowl breeding success is largely attributable to special waterfowl facilities (such as Slimbridge and Cleres) and private breeding operations. The latter may be holding numbers of these species not reported to the yearbook.

Falconiformes. Twenty-one forms (11 sp., 10 ssp.) are endangered. Four were reported in

captivity, none breeding in 1964 through 1970. The southern bald eagle, doubtless represented in captivity, either could not be or was not differentiated in captivity. The California condor is represented by a single Los Angeles bird. The monkey-eating eagle was exhibited in proportionately large numbers, as follows:

1964	17 birds	1 reported pair
1965	25 "	0 " "
1966	18 "	0 " "
1967	12 "	1 " "
1968	11 "	? " "
1969	13 "	1 " "
1970	14 "	1 " "

The Hawaiian hawk has averaged three captive specimens each year since 1964, but infrequently as a potentially breeding pair.

TABLE 3. ANALYSIS OF RARE AND ENDANGERED ANSERIFORMES FREQUENTLY BREEDING IN CAPTIVITY

Species	Year	Number of Zoos			Population		Percent Captive Born
		Total	Poten.	Births	Total	Births	
<i>Branta sandvicensis</i> (Hawaiian goose)	1964	15	14	2	127(127)	1+	100
	1966	16	9	3	93 (93)	15+	100
	1968	16	13	2	153(153)	74	100
	1970	18	16		173(172)		99
<i>Cereopsis novae-hollandiae</i> (Cereopsis)	1964	38	33	16	166(107)	56	64
	1966	63	51	18	246(117)	52	48
	1968	72	58	23	326(168)	74	52
	1970	74	60		341(236)		70
<i>Dendrocygna arborea</i> (Cuban tree duck)	1964	*n.d.	n.d.	3	n.d.	25	n.d.
	1966	23	19	6	142 (34)	22	24
	1968	36	26	5	185 (75)	37	40
	1970	37	26		183 (71)		39
<i>Anas aucklandica chlorotis</i> (New Zealand brown teal)	1964	1	1	?	?	?	?
	1966	4	3	1	25 (23)	23	92
	1968	5	3	1	15 (10)	6	67
	1970	3	1		12 (11)		92
<i>Anas diazi</i> (Mexican duck)	1964		n.d.				?
	1966		n.d.				?
	1964	5	4	n.d.	17 (10)	n.d.	59
	1970	6	5		19 (10)		53
<i>Anas laysanensis</i> (Laysan duck)	1964	10	10	3	107 (66)	17	62
	1966	28	25	16	174(107)	14	61
	1968	36	32	14	245(165)	64	67
	1970	48	41		292(233)		80
<i>Anas platyrhynchos wyvilliana</i> (Hawaiian duck)	1964	7	6	3	45 (34)	17	76
	1966	11	9	4	52 (37)	14	71
	1968	12	12	7	134 (39)	45	29
	1970	18	18		216(168)		78
<i>Branta canadensis leucopareia</i> (Aleutian Canadian goose)	1964		*n.d.				
	1966		n.d.				
	1968	4	2	1	8 (4)	3	50
	1970	7	4		18 (9)		50

* n.d. = no data

Galliformes. Thirty-two forms (20 sp., 12 ssp.) are reported endangered. Nineteen were exhibited in captivity, 11 with some reproductive success. Those species exhibited but not breeding were Asian forms which are extremely rare and virtually impossible to obtain, including Blyth's tragopan, western tragopan, Chinese monal, Sclater's monal, imperial pheasant, and Malaysian peacock pheasant. Also included were the greater prairie chicken and lesser prairie chicken

(Table 4). Data from private breeders is no doubt lacking.

White-eared pheasant, mikado pheasant, Hume's pheasant, and palawan peacock pheasant all indicate consistent captive gains with small numbers being acquired from the wild except for the white-eared pheasant.

Elliot's pheasant, Edwards' pheasant, brown-eared pheasant, and Cabot's tragopan are essentially holding their own.

TABLE 4. ANALYSIS OF RARE AND ENDANGERED GALLIFORMES FREQUENTLY BREEDING IN CAPTIVITY

Species	Year	Number of Zoos			Population		Percent Captive Born
		Total	Breed. Poten.	Births	Total	Births	
<i>Tragopan caboti</i> (Cabot's tragopan)	1964	13	8	1	26 (10)	3	38
	1966	1	1	1	8 (5)	7	63
	1968	2	2	2	13 (10)	5	77
	1970	1	1		9 (8)		89
<i>Crossoptilon c. crossoptilon</i> (White-eared pheasant)	1964	*n.d.					
	1966	12	8	1	37 (1)	?	3
	1968	12	5	1	18 (3)	7	17
	1970	7	6		32 (23)		72
<i>Crossoptilon mantchuricum</i> (Brown-eared pheasant)	1964	24	21	4	79 (62)	23	78
	1966	26	22	3	75 (29)	17	39
	1968	33	24	2	91 (49)	1	54
	1970	24	15		62 (41)		66
<i>Lophura edwardsi</i> (Edward's pheasant)	1964	23	15	2	52 (41)	2	79
	1966	28	16	2	82 (49)	4	60
	1968	23	15	6	66 (38)	29	58
	1970	23	14		69 (49)		70
<i>Lophura swinhoii</i> (Swinhoe's pheasant)	1964	65	52	19	286(203)	82	71
	1966	88	?	19	343(189)	75+	55
	1968	91	?	23	339(196)	97	55
	1970	*n.d.	n.d.		n.d.		?
<i>Syrnaticus ellioti</i> (Elliott's pheasant)	1964	38	31	10	138(115)	35+	83
	1966	47	37	10	169 (98)	86	58
	1968	52	39	8	216(154)	64	71
	1970	36	27		114 (81)		71
<i>Syrnaticus h. humiae</i> (Hume's pheasant)	1964	9	8	2	27 (6)	20	22
	1966	15	13	7	84 (42)	107	50
	1968	24	20	7	133 (83)	87	62
	1970	35	29		125 (99)		79
<i>Syrnaticus mikado</i> (Mikado pheasant)	1964	13	9	1	30 (12)	0	40
	1966	18	8	2	31 (4)	9	13
	1968	25	17	2	73 (37)	40	51
	1970	32	24		224(181)		81
<i>Polyplectron emphanum</i> (Palawan peacock pheasant)	1964	*n.d.	n.d.	1	n.d.	2	n.d.
	1966	20	16	3	78 (19)	7	24
	1968	20	16	3	80 (19)	13	24
	1970	26	14		72 (23)		32
<i>Catreus wallichii</i> (Cheer pheasant)	1964	n.d.	n.d.	4	n.d.	4+	n.d.
	1966	n.d.	n.d.	6	n.d.	50+	n.d.
	1968	n.d.	n.d.	5	n.d.	49	n.d.
	1970	21	16		99 (80)		81

* n.d. = no data

Cabot's tragopan indicates no additions from the wild and virtually a totally captive-born group. Elliot's pheasant, Edwards' pheasant, and brown-eared pheasant are not thought to have been imported recently and the wild-caught numbers probably reflect failure of reporting institutions to indicate origin. Swinhoe's pheasant, although remaining stable in zoos, is being managed well on Taiwan, including one re-introduction (six pairs) by the Ornamental Pheasant Trust. If one assumes some numbers of birds being released to or held by private breeders, it is probably self-supporting. Insufficient data makes comment on the Cheer pheasant difficult, although it is breeding well.

The number of institutions exhibiting these species and/or possessing breeding potential is declining or remaining stable in all cases except, Swinhoe's pheasant, Hume's pheasant, mikado pheasant, and palawan peacock pheasant. Other than the breeding program at the Arizona-Sonora Desert Museum in the early 1960s, no masked-bobwhite were reported until the 1970 census (two individuals in two zoos).

Gruiformes. Twenty-one forms (14 sp., 7 ssp.) are Red Book species. Nine are reported in IZY censuses, with three reported to have bred in captivity. Data on the whooping crane is familiar and not included here, San Antonio having the only recent zoo success. A major federal pro-

gram is underway at Patuxent, Maryland. One successful hatch is reported for the Kagu. The Japanese crane (Table 5) indicates some captive breeding success, although data indicates decline in all categories.

Small numbers of Florida sandhill crane, Siberian crane, black-necked crane, horned coot, and Hawaiian gallinule were reported in captivity with no breeding. Most distressing was the dramatic increase in hooded crane numbers without known pairings, as follows:

1964	4 birds	1 breeding potential
1965	4 "	1 " "
1966	23 "	5 " "
1967	46 "	10 " "
1968	73 "	13 " "
1969	96 "	16 " "
1970	85 "	16 " "

Columbiformes. Of the 16 endangered forms, two species of pigeon (great pigeon and Mindoro imperial pigeon) were noted in captivity in small numbers with no reported breeding.

Psittaciformes. There are 29 endangered forms (10 sp., 9 ssp.). Eleven were reported in captivity, with four showing reproductive success. Table 5 shows data for the three most successful forms, all indicating upward trends in captive breeding success (hooded paradise parakee, turquoise parakeet, splendid parakeet).

TABLE 5. ANALYSIS OF RARE AND ENDANGERED GRUIFORMES, PSITTACIFORMES AND PASSERIFORMES FREQUENTLY BREEDING IN CAPTIVITY

Species	Year	Number of Zoos			Population		Percent Captive Born
		Total	Breed. Poten.	Births	Total	Births	
<i>Grus japonensis</i> (Japanese crane)	1964	20	13	1	50 (20)	1	40
	1966	22	13	2	60 (13)	1	22
	1968	16	8	1	34 (19)	1	56
	1970	18	8		33 (12)		36
<i>Psephotus chrysopterygius dissimilis</i> (Hooded paradise parakeet)	1964	*n.d.	n.d.	1	n.d.	?	?
	1966	n.d.	n.d.	1	n.d.	3	?
	1968	5	4	2	20 (14)	5	70
	1970	4	3		36 (25)		69
<i>Neophema pulchella</i> (Turquoise parakeet)	1964	6	4	3	18 (17)	15+	94
	1966	20	16	2	104 (50)	9	48
	1968	23	20	6	117 (66)	22	56
	1970	29	24		145 (85)		59
<i>Neophema splendida</i> (Splendid parakeet)	1964	6	3	1	13 (9)	5	69
	1966	8	5	6	46 (33)	60	72
	1968	11	10	3	48 (26)	30	54
	1970	14	11		101 (77)		76
<i>Leucopsar rothschildi</i> (Rothschild's myna)	1964	17	11	3	50 (5)	8+	10
	1966	33	15	3	111 (17)	6+	15
	1968	36	23	5	115 (39)	11	34
	1970	43	19		114 (48)		42

* n.d. = no data

The thick-billed parrot bred infrequently (three times).

Passeriformes. One-hundred-thirty-six species and subspecies of perching birds are reported as rare and endangered. Five were reported in captivity with two reported as breeding, including an isolated hatch of grey-necked rock fowl (*Picathartes*) and Rothschild's myna. Data for the latter is in Table 5. Captive reproductive success is increasing. Wild imports have slowed.

MAMMALS

Table 6 provides an ordinal summary for mammals. For the 19 orders of mammals, five (*Monotremata*, *Dermoptera*, *Pholidota*, *Tubulidentata*, and *Hyracoidea*) contain no rare and endangered forms. The remaining 14 orders contain 291 rare and endangered forms, of which 162 (55.6 percent) were represented in captivity. Endangered whales and bats were not represented. Eighty-seven forms indicated breeding in captivity (59 breeding regularly and 28 with three or less birth occurrences during the study period). This is 53.7 percent of all forms exhibited and 22.2 percent of all endangered forms.

While by comparison with birds the overall picture looks better, a detailed analysis for mammals (Perry, Bridgwater, and Horseman, 1972) indicates that only three mammals (wisent, Pere David deer, and Przewalski horse) were entirely supported by captive breeding programs, while only the mongoose lemur, Siberian tiger,

onager, Formosan sika, and addax were close to self-support. The remaining forms were either being supported by wild stock only, increasing in captivity much too slowly, or diminishing.

DISCUSSION AND SUMMARY

Among the 62 endangered bird forms reported in captivity during the period of the study, 32 are totally dependent upon wild acquisition. Six others have shown only one to three breeding occurrences. Status of the remaining 24 forms varies from the successful saving of the nene to the slow decline of Cabot's tragopan without the infusion of wild stock.

Only the *Anseriformes*, *Galliformes*, and to a lesser degree, the *Psittaciformes* indicate significant reproductive success.

Generally, both the number of zoos exhibiting endangered species and the number of zoos with reproductive potentials are increasing; however, only a very few specialty institutions such as the Wildfowl Trust and the Ornamental Pheasant Trust and similar private institutions are responsible for the bulk of captive-bred individuals.

The ratio of potential breeding groups to actual birth events is low and stable, while the number of zoos actually exhibiting endangered forms is increasing.

An arbitrary attempt was made to identify those species where zoo propagation gives some assurance that they could be effectively main-

TABLE 6. ORDINAL SUMMARY OF CAPTIVE STATUS FOR RARE AND ENDANGERED MAMMALS 1964-1970

Order	IUCN Forms	Forms in Captivity	¹ Rarely	Captive Breeding Frequent	Total
Monotremata	0	0	0	0	0
Marsupialia	30	4	1	3	4
Insectivora	4	1	0	0	0
Dermoptera	0	0	0	0	0
Chiroptera	2	0	0	0	0
Primates	46	32	12	8	20
Edentata	6	5	0	1	1
Pholidota	0	0	0	0	0
Lagomorpha	4	1	1	0	1
Rodentia	24	8	4	0	4
Cetacea	8	0	0	0	0
Carnivora	² 56	31	6	13	19
Pinnipedia	11	6	0	0	0
Tubulidentata	0	0	0	0	0
Proboscidea	1	1	0	0	0
Hyracoidea	0	0	0	0	0
Sirenia	5	5	0	0	0
Perissodactyla	17	14	1	11	12
Artiodactyla	77	44	3	23	26
Total	291	162	28	59	87

¹ Less than 3 births reported
² Includes Bengal tiger

tained without wild infusions. The following criteria were applied to the 62 captive bird forms: 1) current captive population of at least 125; 2) 50 percent of total population captive born; and 3) present at 20 institutions with breeding potential.

Using these criteria, only Swinhoe's pheasant, mikado pheasant, Hume's pheasant, Elliott's pheasant, nene, cereopsis, Laysan duck, Hawaiian duck, Cuban tree duck, and turquoise parakeet qualify.

These criteria are no doubt minimal, and if breeding programs are not quickly effected concentrating upon captive survival, and if the expenditure of effort, time, money, and technical resources is not provided by joint effort and at the expense of an "animals for exhibit only" philosophy, then zoos may be in danger of failing in their preservation and propagation objectives.

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